

TECHNICAL MEMORANDUM

TO: Chad LaFontaine
Executive Director
Southeastern States Air Resources Managers, Inc. (SESARM)

FROM: Regi Oommen, Eastern Research Group, Inc. (ERG)

DATE: December 21, 2020

SUBJECT: Task 11 – Additional Requests

1.0 INTRODUCTION

Under this contract, SESARM initiated Task 11 for additional requests not included in the original Scope of Work (SOW) in the Request for Proposal (RFP). Three sets of requests were satisfied under this task, and these requests are presented below.

2.0 ADDITIONAL REQUEST #1: DATA EXTRACTIONS OF INITIAL CONDITIONS AND BOUNDARY CONDITIONS

Under this subtask, ERG directed Alpine to extract initial conditions and boundary conditions (IC/BC) from the 2011 and 2028 VISTAS_12 CAMx simulations. Initially, up to five roughly state-sized CAMx domains were to be extracted, with an additional five domains that could be added by request.

In August 2018, SESARM states confirmed the five geographic domains for extraction, and they are presented in Table 1.

Table 1. Geographic Specifications for the IC/BC Extractions

State	Lower Left Coordinates	Upper Right Coordinates
Alabama	672, -1236	1236, -396
Florida	792, -1596	1920, -804
Georgia	816, -1068	1680, -300
North Carolina	1104, -852	1956, -96
Tennessee	540, -600	1452, -168

Figure 1 through Figure 5 present the geographic boundaries for each state request.

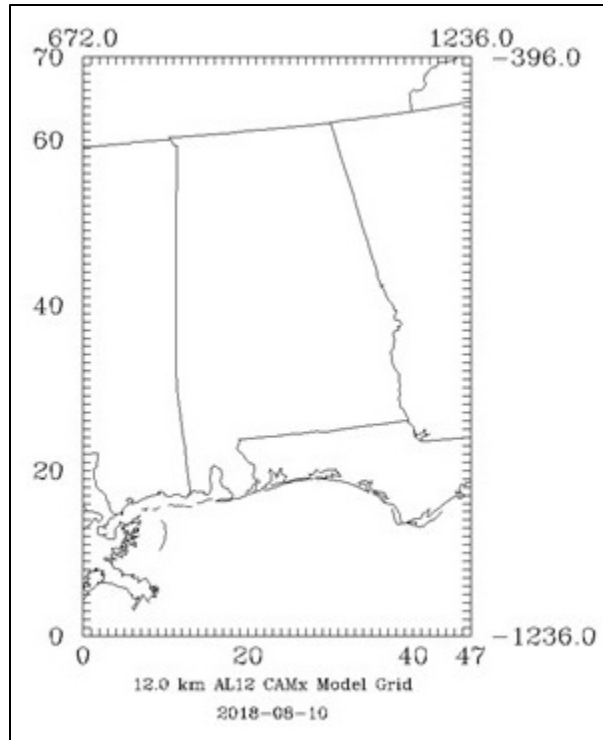


Figure 1. Geographic Boundary Map for IC/BC Extraction for Alabama

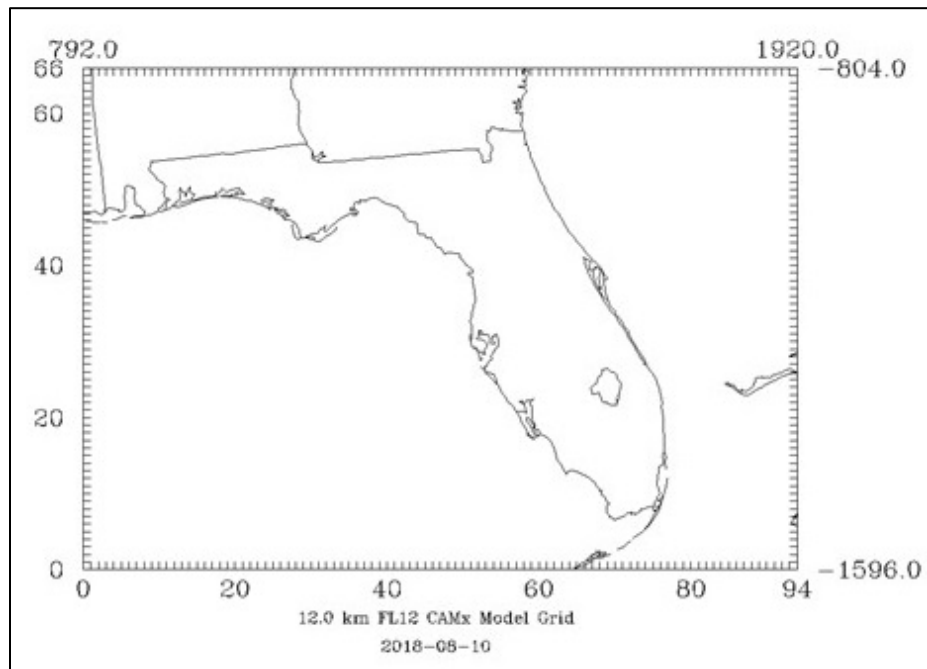


Figure 2. Geographic Boundary Map for IC/BC Extraction for Florida

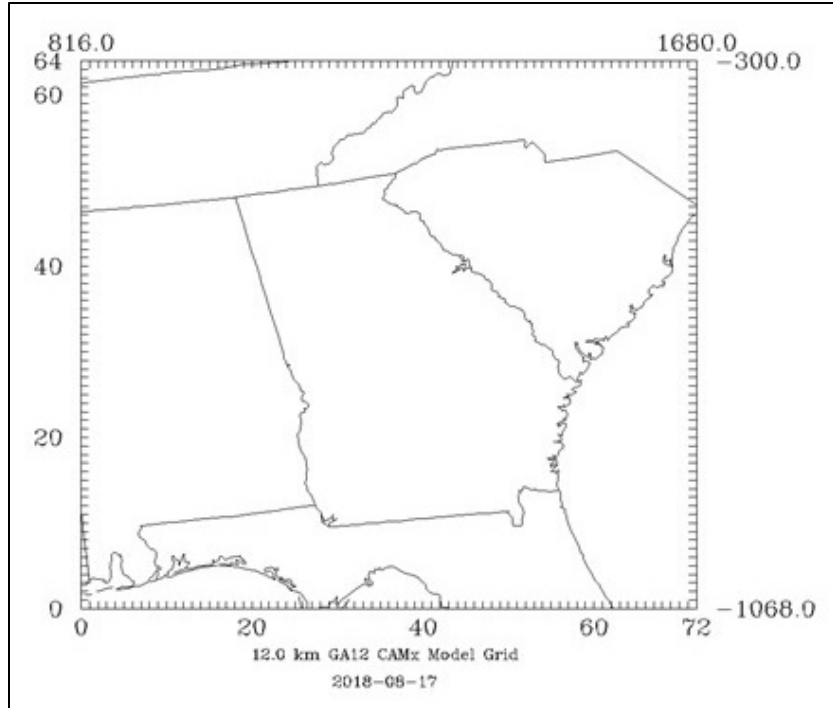


Figure 3. Geographic Boundary Map for IC/BC Extraction for Georgia

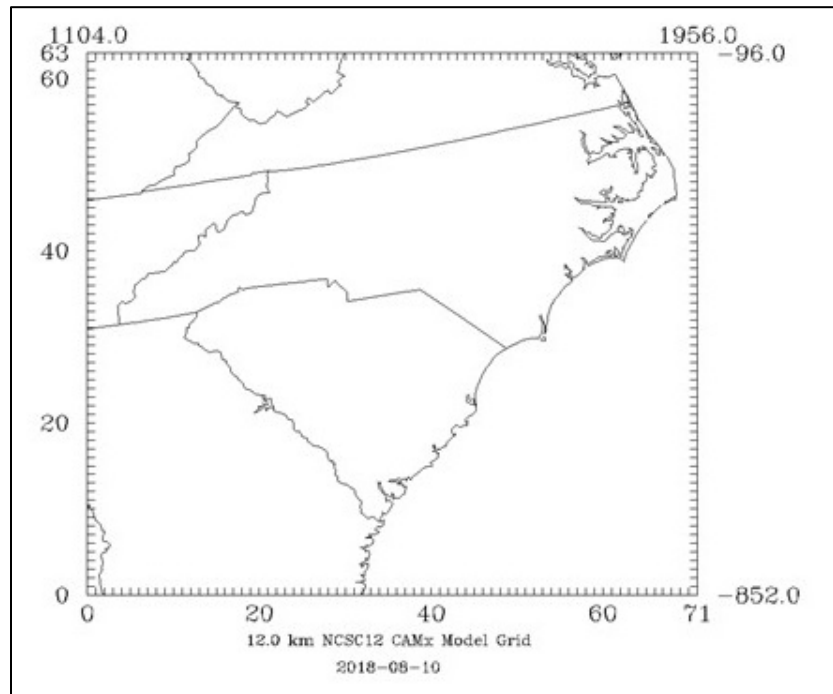


Figure 4. Geographic Boundary Map for IC/BC Extraction for North Carolina

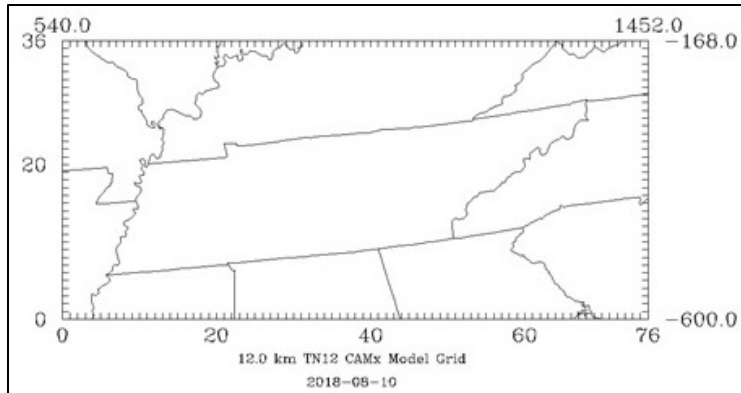


Figure 5. Geographic Boundary Map for IC/BC Extraction for Tennessee

The IC/BC data for each state are preserved on an external Serial Advanced Technology Attachment (SATA) disk that can be shared with each requesting state.

3.0 ADDITIONAL REQUEST #2: DEVELOPING EMISSIONS for REMODELING

As documented in the Task 2B and Task 3B reports, SESARM directed ERG to review newer and updated 2028 emissions information from:

- Point sources 2028 emissions projected from the 2016 modeling platform developed by the U.S Environmental Protection Agency (EPA).
- Version 16.0 of the 2028 electricity generating unit (EGU) emissions developed by the Eastern Regional Technical Advisory Committee (ERTAC).
- Specific emissions changes identified after the Area of Influence (AoI) review.

In December 2019, ERG prepared side-by-side emissions estimates for all point source facilities in the VISTAS_12 domain. As presented in Table 2, emissions in tons per year (tpy) from oxides of nitrogen (NO_x) were approximately 20% lower and emissions from sulfur dioxide (SO₂) were nearly 46% lower than emissions used for the original (“elv3”) modeling.

Table 2. 2028 Point Emissions Comparison, elv3 vs. EPA 2028 based on 2016 Platform

VISTAS Domain States	Point NO _x Emissions (tpy)			Point SO ₂ Emissions (tpy)		
	2028 elv3	EPA 2028	% Diff.	2028 elv3	EPA 2028	% Diff.
SESARM	590,052	542,524	-8.1%	455,577	300,585	-34.0%
Non-SESARM	2,051,412	1,565,591	-23.7%	2,118,965	1,099,702	-48.1%
Total	2,641,464	2,108,116	-20.2%	2,574,542	1,400,287	-45.6%

Table 3 compares just the ERTAC 16.0 version with the “elv3” modeling emissions for EGUs. Emissions from NO_x were approximately 24% lower and emissions from SO₂ were nearly 44% lower than emissions used for the original (“elv3”) modeling. The full comparison file is in Attachment A, titled “TASK_11_3_COMPARISONS_20191218.xlsx”.

Table 3. 2028 EGU Emissions Comparison, elv3 vs. ERTAC 2028, Version 16.0

VISTAS Domain States	NO _x Emissions (tpy)			SO ₂ Emissions (tpy)		
	2028 elv3	ERTAC 2028	% Diff.	2028 elv3	ERTAC 2028	% Diff.
SESARM	246,719	200,791	-18.6%	231,414	161,503	-30.2%
Non-SESARM	637,195	467,244	-26.7%	1,337,078	712,388	-46.7%
Total	883,914	668,035	-24.4%	1,568,492	873,890	-44.3%

After consultation with EPA in January 2020, and in light of the significant decreases in emissions of these key pollutants within the VISTAS_12 domain, SESARM directed ERG to prepare emission comparison tables for each SESARM state consisting of:

- Facility, Unit, and Process-Level information;
- Stack parameters and locational coordinates;
- 2011v6.3el emissions;
- 2023v6.3en emissions;
- 2028v6.3el emissions;
- 2028 ERTACv2.7 emissions;
- Final 2028 VISTAS emissions (also called “elv3”);
- 2028 EPA emissions from the 2016 platform;
- 2028 ERTACv16.0 emissions; and
- Revised 2028 emissions for VISTAS Remodel (filled in by VISTAS states and used for “elv5”).

States compared the emissions used for the “elv3” modeling to the 2028 EPA emissions from the 2016 platform and the 2028 ERTACv16.0 emissions and decide whether to update emissions or keep as-is using the “Revised 2028 emissions for VISTAS Remodel” field.

In addition, for EGU emissions in non-VISTAS states, VISTAS agreed to replace the ERTACV2.7 2028 forecast (projected from a 2011 base year) in elv3 with the ERTAC16.0

forecast (projected from a 2016 base year) in elv5. After consultation with the other RPOs, LADCO requested that VISTAS use ERTAC16.1 in place of ERTAC16.0 for its states as the ERTAC16.1 forecast for 2028 corrected issues associated with PM_{2.5} and PM₁₀ emission factors that were unique to EGUs in some of the LADCO states.

Revisions were provided to ERG in February 2020, which were then reviewed, quality-assured, and ultimately placed in the master database. In March 2020, the revised emissions inventory was submitted to Alpine in File Format 2010 (FF10) format for the remodeling. As presented in Table 4, 2028 elv5 emissions in tons per year (tpy) from NO_x were approximately 10% lower and emissions from SO₂ were nearly 31% lower than emissions used for the 2028 elv3 modeling.

Table 4. 2028 Point Emissions Comparison, elv3 vs. elv5

VISTAS Domain States	Point NO_x Emissions (tpy)			Point SO₂ Emissions (tpy)		
	2028 elv3	2028 elv5	% Diff.	2028 elv3	2028 elv5	% Diff.
SESARM	590,052	563,637	-4.5%	455,577	369,520	-18.9%
Non-SESARM	2,051,412	1,807,167	-11.9%	2,118,965	1,404,416	-33.7%
Total	2,641,464	2,370,804	-10.2%	2,574,542	1,773,936	-31.1%

4.0 ADDITIONAL REQUEST #3: DAY-BY-DAY ANALYSIS

SESARM tasked Alpine with expanding the Particulate Source Apportionment Technology (PSAT) results by providing day-by-day results for each of the tagged scenarios relative to Class I areas in the VISTAS_12 domain for the 2028 elv3 base case simulation. The results are presented in light extinction (b_{ext}) with units of inverse megameters (Mm^{-1}) with underlying sulfate and nitrate concentration contributions. The day-by-day results are presented in Attachment B of this memorandum, in the Excel workbook entitled “DAY_BY_DAY_GROUP_10_90_20200325.xlsx” file. The Excel workbook contains the tabular and graphical results of the 2028elv3 base case and the individual scenario contribution to light extinction for the selected Class I area. The scenarios are summarized in the Task 7 Report on PSAT Tagging.

Figure 6 presents the Day-By-Day results for the Wolf Island Class I area for the 20% Clearest Days, and Figure 7 presents results for the 20% Most Impaired Days.

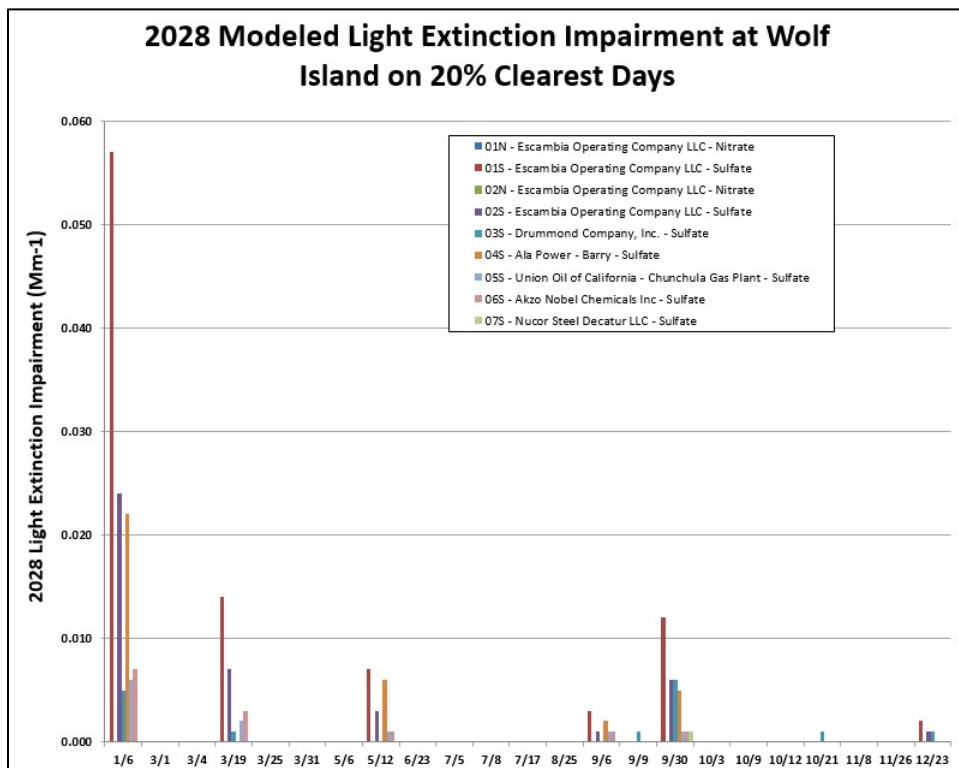


Figure 6. Day-By-Day Results for the 20% Clearest Days at the Wolf Island Class I Area.

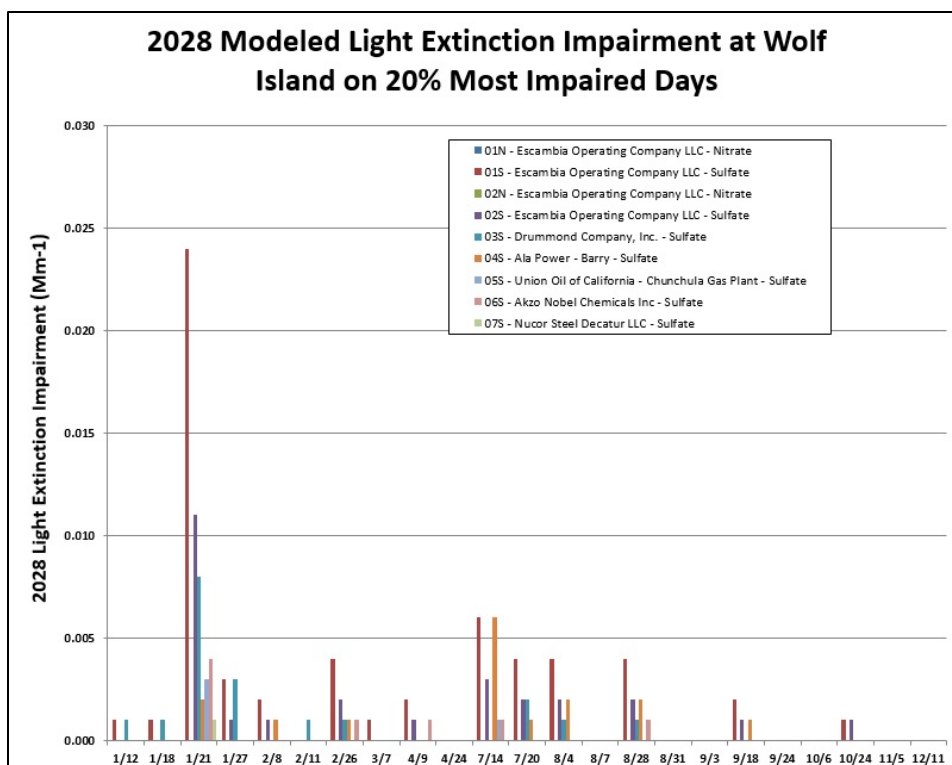


Figure 7. Day-By-Day Results for the 20% Most Impaired Days at the Wolf Island Class I Area.

The steps for preparing the results in the [Final Chart] tab are presented in the Read Me tab, and are also listed below:

1. Select a single Class I area of interest using the drop-down selections in Cell B1.
2. Select the single impairment group of choice using the drop-down selections in Cell B2. Group 10 represents the 20% clearest days; Group 90 represents the 20% most anthropogenically impaired days.
3. Select the PSAT tagged scenario(s) that you want to include in the table and chart represented on the tab. PSAT tagged groups are cross-referenced by code in the tab [Xref] in Columns L and M.

The selected impairment group days will be shown on the x-axis of the graph with modeled concentration contribution to impairment (Mm^{-1}) on the y-axis. The taller the bar, the greater the modeled impact on the Class I area. The table behind the graph provides the impairment group date [Column A] and PSAT tagged scenarios [Columns B+] and the modeled concentration contribution. Because this table and graph present the modeled difference in the PSAT tag run compared to the base case run and does not utilize the relative response factor

(RRF) calculations for visibility, these results cannot be directly correlated to the base case visibility at any Class I area. These data are to be used to demonstrate relative contribution across days, not necessarily relative contribution to the overall visibility impairment metrics.

The [**Group Data**] tab presents the resultant modeling data by Class I area monitor, PSAT tag scenario, pollutant, date of modeled result, base case concentration, PSAT tag scenario concentration, impairment group, modeled base case light extinction, scenario case light extinction, scenario case contribution to light extinction, scenario name, and Class I area name. Values in Column J [bext_delta] represent the modeled light extinction contribution from the scenario in that row. Values in Column J = 0 indicate that the selected scenario has no modeled light extinction contribution to the selected Class I area in that row.

The [**Xref**] tab provides lookup information for the [Final Chart] tab and scenario definition spreadsheet values.

Attachment A – Emissions Comparisons

(See the Excel Workbook “TASK_11_3_COMPARISONS_20191218.xlsx” file.)

Attachment B – Day-By-Day Results

(See the Excel Workbook “DAY_BY_DAY_GROUP_10_90_20200325.xlsx” file.)